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November 15, 2001

FH-0105384

Ms. J. H. Kessner, Program Manager
Analytical Services
Bechtel Hanford
3190 George Washington Way H9-03
Richland, Washington 99352

Dear Ms. Kessner:

**FINAL RESULTS FOR THE 233S L-16 VESSEL PIPE AND L-6 VESSEL SLUDGE
SAMPLES—SDG S0031 AND S0032**

References: (1) Letter, A. S. Chaloupka, BHL, to E. F. Mares, FH, "Letter of Instruction for the 233S Plutonium Concentration Facility Sample Analysis," 084911, dated December 20, 2000.
(2) HNF-SD-CD-QAPP-016, Rev. 5, "222-S Laboratory Quality Assurance Plan," dated April 2, 2001.

This letter and attachments present the final results for the L-16 vessel pipe (B124H1 and B124H1-A) and the L-6 vessel sludge (B124H2) samples received at the 222-S Laboratory from the 233S Plutonium Concentration Facility process areas on May 30, 2001. The samples were analyzed for those analytes indicated on the attached copy of the chain of custody form in accordance with the *Letter of Instruction for the Plutonium Concentration Facility Sample Analysis* referenced above.

If you have any questions regarding this report, please feel free to call me on 373-4314.

Sincerely,



Ruth A. Bushaw, Project Coordinator
222-S Production Control Support

lda

Attachments (7)

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ATTACHMENT 1

**FINAL RESULTS FOR THE 223S L-16 VESSEL PIPE AND L-6 VESSEL
SLUDGE SAMPLES-SDG S0031 AND S0032**

**Consisting of 6 pages
Including cover page**

FINAL RESULTS FOR THE 233S L-16 VESSEL PIPE AND L-6 VESSEL SLUDGE SAMPLES – SDG S0031 AND S0032

One pipe sample (B124H1/B124H-1A, SDG S0031) and one sludge sample (B124H2, SDG S0032) from the 233S Plutonium Concentration Facility were received at the 222-S Laboratory on May 30, 2001. The samples were analyzed for those analytes indicated on the attached copies of the chain of custody (COC) forms in accordance with the *Letter of Instruction for the 233S Plutonium Concentration Facility* (LOI), referenced in the cover letter.

A Data Summary Report is included as Attachment 2. The correlation between customer sample identification numbers and laboratory identification numbers are presented in the sample breakdown diagrams included as Attachment 3. Copies of the chain of custody and Request for Sample Analysis forms are included as Attachment 4. Correspondences concerning analysis variances that were accepted by the 233-S Project personnel are included in Attachment 5.

On June 18, 2001, a request was received by electronic mail (included in Attachment 5) to analyze the exterior of the pipe sample (B124H1-A) for polychlorinated biphenyls (PCB). Another electronic mail message, received on August 9, 2001, indicated that the distribution of PCBs on the exterior of the pipe would be associated with the paint/fixative. Therefore, only the paint/fixative was analyzed for PCB. The SW-846 holding time of 14 days to extract the samples for the PCB analysis was missed because of the 18-day delay between the sampling date and the request for the analysis. No PCBs greater than 50 ppm were detected in the sample. The analysis results are included in the Data Summary Report.

In October 2001, the 222-S Laboratory reported that there was a potential discrepancy in the actual volume of acid present in vials that were used for making 10-mL dilutions of samples for certain radionuclide analyses. A reanalysis was performed only for those samples/tests that were potentially affected by this discrepancy. This reanalysis time delayed issuance of this letter report. Only the reanalysis results are included in the Data Summary report.

Table 1 lists the samples with results that are different from those previously reported in Interim Results Reports.

Table 1. SDG S0031 and S0032 Results that Changed Since Interim Results Released

Sample ID	Affected Results
SDG S0031	
B124H1 1st Etch of pipe interior (S01M000258 – new sample S01M000332)	^{238}Pu , $^{239/240}\text{Pu}$, ^{241}Am and $^{243/244}\text{Cm}$
B124H1-A 1st Etch of pipe exterior (S01M000223 – new sample S01M000332)	^{238}Pu , $^{239/240}\text{Pu}$, ^{241}Am and $^{243/244}\text{Cm}$
B124H1-A paint/fixative (S01M00252)	Total alpha/Total beta ^{238}Pu , $^{239/240}\text{Pu}$, ^{241}Am and $^{243/244}\text{Cm}$
SDG S0032	
B124H2 L-6 Vessel Solid (S01M000218)	Total alpha/Total beta

Sample Appearance and Handling

SDG S0031 – This sample delivery group consists of customer sample numbers B124H1 and B124H1-A. These numbers were associated with the interior (B124H1) and exterior (B124H1-A) of a piece of pipe from the L-16 vessel. Length and diameter measurements were made with a ruler. The length was measured in inches (in.) and the inside and outside diameters in centimeters (cm.). The measurements assume uniform thickness and squarely cut ends and should be considered estimates. The length is approximately 9 ¾ inches (24.8 cm). The outside diameter is approximately 6.4 cm and the inside diameter is approximately 5.0 cm.

The pipe was too heavy to weigh on the available balance. The weight was estimated to be 5 ¼ to 5 ½ pounds, based on the measured dimensions and the densities of typical steels. Attachment 6 contains a worksheet with these calculations.

The subsamples for analysis of the interior and exterior of the pipe were obtained in accordance with the test procedure included as Attachment 7. For the interior of the pipe, only about 8 ¼ inches of the interior was exposed to the etching solution because the rubber stopper plugs covered approximately ¾ in. at each end. For the etching of the exterior, the paint/fixative was removed from about 2.2 in. of the pipe and only this portion was exposed to the etching solution. The reported results reflect the total µg or µCi of analyte removed from these exposed sections of the pipe.

SDG S0032 – This sample delivery group consists of customer sample number B124H2, L-6 vessel solid. This sample is a brown dry solid that had some powdery material and some flakes about ¼ inch in diameter. The sample was not blended, but a representative mixture of the powder and flakes was used for the sample digest.

Analytical Results

Holding Times

As stated previously, the SW-846 holding time of 14 days to extract the samples for the PCB analysis was missed because of the 18-day delay between the sampling date and the request for the analysis. The PCB analysis was performed within the holding time between extraction and analysis.

The SW-846 holding time of 6 months for total alpha analysis was met. There were no other applicable holding times for the analysis of these samples.

General Analysis Results Discussion

For the analysis of the pipe, both specific alpha (plutonium, americium and neptunium) and gross (total) alpha analyses were requested. The gross alpha results were about 71% to 88% of the sum of the individual alpha emitters. This is typically caused by traces of solids on the alpha sample mounts causing self-absorption. These are the best results that can be obtained based on the nature of the solutions analyzed.

Comparison of plutonium and neptunium results between radiochemical methods and inductively coupled plasma/mass spectrometry (ICP/MS) showed very good agreement.

Quality Control Results

Laboratory Control Standards

All laboratory control standard (LCS) recoveries were acceptable in accordance with the 222-S Laboratory Quality Assurance Plan (QAPP-016), referenced in the cover letter, except for the Aroclor 1254 LCS for the PCB analysis. The recovery of this standard (134%) was slightly higher than the limits of 70% - 130% typically considered as acceptable. Since a high LCS recovery might indicate that results are biased, and the sample results were less than the TSCA regulatory limits, no reanalysis was requested.

Matrix Spikes/Matrix Spike Duplicates/Sample Duplicates

Per the LOI, no matrix spikes, matrix spike duplicate or duplicate samples were required.

Preparation Blanks

Low levels of alpha contamination were detected in all of the method and preparation blanks. Low levels of beta contamination were detected in the acid digest and fusion digest preparation blanks associated with the analysis of the paint/fixative from the exterior of the pipe (B124H1-A) and the L-6 vessel solid sample (B124H2). In all cases, the level of contamination represented, at most, 2% of the activity reported for the associated samples and was considered insignificant in accordance with QAPP-016. No reanalysis was requested.

Practical Quantitation Limits (PQL)

For the analysis of the pipe (B124H1 and B124H1-A), the interior and exterior surfaces were etched with acid and the results were reported on a "per sample" basis. No customer requested practical quantitation limits (PQLs) were given on a "per sample" basis. The only analyses with applicable PQLs were the paint/fixative from the pipe exterior (B124H1-A) and the L-6 vessel solid (B124H2), which were reported on a "per gram" basis. For those analytes reported as non-detected for these two samples, PQLs or detection limits (DL) were not met for the following analytes.

For gamma energy analysis (GEA), cobalt-60, cesium-137, europium-152, europium-154, europium-155 and radium-226 had detection limits reported above the requested PQLs. This was due to the small sample size, driven by the amounts of americium and plutonium in the samples.

The PQL for curium-243/244 by alpha energy analysis (AEA) was not met because of the dilution required to reduce the activity of americium-241 in the samples.

For ICP/MS, PQLs were not met for uranium-234 and uranium-235 because of the dilution required to reduce the concentration of uranium-238 in the sample.

Surrogate Recoveries

The recoveries for the surrogates (tetrachloro-m-xylene (TCX) and decachlorobiphenyl (DCB)) were within the allowed recovery limits of 50% - 150%. The recoveries ranged from 54.4 % to 56.4% for the TCX and from 73.3% to 88.8% for the DCB.

Analytical Procedures

Table 2 presents the 222-S Laboratory analytical procedures used to generate the reported results.

Table 2. Analytical Procedures

Analysis	Preparation Procedure	Analysis Procedure
Inorganic Analysis		
ICP/MS (actinides)	Direct for Etching Solution Fusion for Paint/Fixative	LA-506-101 Rev A-4
Radionuclide Analyses		
AT/TB	Direct for Etching Solution Fusion for Paint/Fixative Acid Digest for Solid	LA-508-101 Rev. G-2
²⁴¹ Am ^{243/244} Cm	Direct for Etching Solution Fusion for Paint/Fixative	LA-953-104 Rev B-4
²³⁸ Pu & ^{239/240} Pu	Direct for Etching Solution Fusion for Paint/Fixative	LA-953-104 Rev B-4
²³⁷ Np	Direct for Etching Solution Fusion for Paint/Fixative	LA-933-141 Rev H-5
GEA	Direct for Etching Solution Fusion for Paint/Fixative Acid Digest for Solid	LA-548-121 Rev F-2
Organic Analysis		
PCB	LA-523-138 Rev. C-0	LA-523-140 Rev. A-0

Acid digest procedure – LA-505-163 Rev. C-0

Fusion digest procedure – LA-549-141 Rev. G-3

Abbreviations

ICP/MS – ICP/mass spectrometry

AT/TB – total alpha/total beta

Np – neptunium

GEA – gamma energy analysis

Am – americium

Cm – curium

Pu – plutonium

PCB – polychlorinated biphenyls

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ATTACHMENT 2

DATA SUMMARY REPORT

**Consisting of 5 pages
Including cover page**

Attachment 2. Data Summary Report
233S SDG11

CUSTOMER SDG #: S0031
CUSTOMER SAMPLE ID: B124N1

SAMPLE PORTION: 1st Etch Pipe Interior

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err%
S01M000258			Np237 by TTA Extraction	uCi/Sample	87.4	<0.0902	<40.6	n/a	n/a	n/a	n/a	43	1.3e+02
S01M000258			Cobalt-60 by GEA	uCi/Sample	109	<2.79e-05	<2.81e-04	n/a	n/a	n/a	n/a	2.8e-04	n/a
S01M000258			Cesium-137 by GEA	uCi/Sample	112	<3.33e-05	<3.83e-04	n/a	n/a	n/a	n/a	3.8e-04	n/a
S01M000258			Europium-152 by GEA	uCi/Sample	n/a	<5.75e-05	<9.43e-04	n/a	n/a	n/a	n/a	9.4e-04	n/a
S01M000258			Europium-154 by GEA	uCi/Sample	n/a	<8.65e-05	<1.07e-03	n/a	n/a	n/a	n/a	1.1e-03	n/a
S01M000258			Europium-155 by GEA	uCi/Sample	n/a	<4.38e-05	<1.47e-03	n/a	n/a	n/a	n/a	1.5e-03	n/a
S01M000258			Radium-226 by GEA	uCi/Sample	n/a	<5.49e-04	<7.47e-03	n/a	n/a	n/a	n/a	7.5e-03	n/a
S01M000258			Americium-241 by GEA	uCi/Sample	n/a	<3.88e-05	1.17e+05	n/a	n/a	n/a	n/a	n/a	0.080
S01M000258			Alpha Env: Solid/Misc (Each)	uCi/Sample	86.8	4.47	2.20e+05	n/a	n/a	n/a	n/a	26	0.80
S01M000258			Beta in Env. Samples (Each)	uCi/Sample	105	<12.4	2.31e+04	n/a	n/a	n/a	n/a	2.3e+02	2.1
S01M000332			Pu-239/240 by TRU-SPEC Resin	uCi/Sample	103	<5.52e+03	1.15e+05	n/a	n/a	n/a	n/a	1.0e+04	2.0
S01M000332			Pu-238 by TRU-SPEC Resin IonEx	uCi/Sample	n/a	<5.52e+03	2.81e+04	n/a	n/a	n/a	n/a	1.0e+04	3.3
S01M000332			Am-241 by TRU-SPEC Resin IonEx	uCi/Sample	108	<1.07e+04	1.20e+05	n/a	n/a	n/a	n/a	1.4e+04	1.9
S01M000332			Cm-243/244 by TRU-SPEC Resin	uCi/Sample	n/a	<1.07e+04	<1.43e+04	n/a	n/a	n/a	n/a	1.4e+04	1.0e+02

2nd Etch Pipe Interior: 2nd Etch Pipe Interior

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err%
S01M000221			Alpha Env: Solid/Misc (Each)	uCi/Sample	86.8	4.47	2.47e+04	n/a	n/a	n/a	n/a	2.6	0.76
S01M000221			Beta in Env. Samples (Each)	uCi/Sample	105	<12.4	2.22e+03	n/a	n/a	n/a	n/a	23	2.1

Attachment 2. Data Summary Report
233S SDG11

CUSTOMER SDG #: S0031
CUSTOMER SAMPLE ID: B124H1-A

SAMPLE PORTION: 1st Etch Pipe Exterior

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err%
S01M000223			Np237 by TTA Extraction	uCi/Sample	87.4	<0.0902	<0.172	n/a	n/a	n/a	n/a	0.20	1.5e+02
S01M000223	D		Uranium-234 by ICP/MS Acid Add	ug/mL	n/a	<1.20e-05	<3.00	n/a	n/a	n/a	n/a	3.0	n/a
S01M000223	D		Uranium-235 by ICP/MS Acid Add	ug/Sample	91.8	<1.20e-05	37.7	n/a	n/a	n/a	98.7	3.0	n/a
S01M000223	D		Uranium-238 by ICP/MS Acid Add	ug/Sample	105	<1.20e-05	6.07e+03	n/a	n/a	n/a	88.1	3.0	n/a
S01M000223	D		Neptunium-237 by ICP/MS	ug/Sample	102	<5.00e-05	366	n/a	n/a	n/a	96.9	13	n/a
S01M000223	D		Plutonium-239 by ICP/MS	ug/Sample	102	<5.00e-05	1.38e+04	n/a	n/a	n/a	63.2	13	n/a
S01M000223	D		Plutonium-240 by ICP/MS	ug/Sample	n/a	<5.00e-05	1.52e+03	n/a	n/a	n/a	n/a	13	n/a
S01M000223	D		Pu/Am-241 by ICP/MS	ug/Sample	n/a	n/a	243	n/a	n/a	n/a	n/a	0.013	n/a
S01M000223			Cobalt-60 by GEA	uCi/Sample	109	<2.79e-05	<3.08e-05	n/a	n/a	n/a	n/a	3.1e-05	n/a
S01M000223			Cesium-137 by GEA	uCi/Sample	112	<3.33e-05	<5.01e-05	n/a	n/a	n/a	n/a	5.0e-05	n/a
S01M000223			Europium-152 by GEA	uCi/Sample	n/a	<5.75e-05	<5.89e-05	n/a	n/a	n/a	n/a	5.9e-05	n/a
S01M000223			Europium-154 by GEA	uCi/Sample	n/a	<8.65e-05	<8.54e-05	n/a	n/a	n/a	n/a	8.5e-05	n/a
S01M000223			Europium-155 by GEA	uCi/Sample	n/a	<4.38e-05	<5.13e-05	n/a	n/a	n/a	n/a	5.1e-05	n/a
S01M000223			Radium-226 by GEA	uCi/Sample	n/a	<5.49e-04	<5.69e-04	n/a	n/a	n/a	n/a	5.7e-04	n/a
S01M000223			Americium-241 by GEA	uCi/Sample	n/a	<3.88e-05	788	n/a	n/a	n/a	n/a	n/a	0.22
S01M000223			Alpha Env: Solid/Misc (Each)	uCi/Sample	86.8	4.47	1.88e+03	n/a	n/a	n/a	n/a	0.10	0.54
S01M000223			Beta in Env. Samples (Each)	uCi/Sample	105	<12.4	164	n/a	n/a	n/a	n/a	0.85	1.5
S01M000334			Pu-239/240 by TRU-SPEC Resin	uCi/Sample	103	<5.52e+03	1.56e+03	n/a	n/a	n/a	n/a	1.3e+02	1.9
S01M000334			Pu-238 by TRU-SPEC Resin IonEx	uCi/Sample	n/a	<5.52e+03	390	n/a	n/a	n/a	n/a	1.3e+02	3.1
S01M000334			Am-241 by TRU-SPEC Resin IonEx	uCi/Sample	108	<1.07e+04	1.67e+03	n/a	n/a	n/a	n/a	1.9e+02	2.0
S01M000334			Cm-243/244 by TRU-SPEC Resin	uCi/Sample	n/a	<1.07e+04	<193	n/a	n/a	n/a	n/a	1.9e+02	1.0e+02

2nd Etch Pipe Exterior: 2nd Etch Pipe Exterior

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err%
S01M000253			Alpha Env: Solid/Misc (Each)	uCi/Sample	86.8	4.47	214	n/a	n/a	n/a	n/a	0.010	0.50
S01M000253			Beta in Env. Samples (Each)	uCi/Sample	105	<12.4	19.2	n/a	n/a	n/a	n/a	0.085	1.4

Paint: Paint

Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count Err%
S01M000250			Aroclor-1016 by SW-846 8082	ug/Kg	n/a	<170	<270	n/a	n/a	n/a	n/a	2.7e+02	n/a
S01M000250			Aroclor-1221 by SW-846 8082	ug/Kg	n/a	<500	<795	n/a	n/a	n/a	n/a	7.9e+02	n/a
S01M000250			Aroclor-1232 by SW-846 8082	ug/Kg	n/a	<460	<731	n/a	n/a	n/a	n/a	7.3e+02	n/a
S01M000250			Aroclor-1242 by SW-846 8082	ug/Kg	n/a	<260	<431	n/a	n/a	n/a	n/a	4.3e+02	n/a
S01M000250			Aroclor-1248 by SW-846 8082	ug/Kg	n/a	<130	<207	n/a	n/a	n/a	n/a	2.1e+02	n/a
S01M000250			Aroclor-1254 by SW-846 8082	ug/Kg	134	<130	4.93e+03	n/a	n/a	n/a	n/a	2.1e+02	n/a
S01M000250			Aroclor-1260 by SW-846 8082	ug/Kg	n/a	<170	<270	n/a	n/a	n/a	n/a	2.7e+02	n/a
S01M000250			Aroclor-1262 by SW-846 8082	ug/Kg	n/a	<130	<207	n/a	n/a	n/a	n/a	2.1e+02	n/a

Paint - Fusion Digest: Paint - Fusion Digest

Fusion Digest: Paint - Fusion Digest														
Sample#	R	A#	Analyte	Unit	Standard %	Blank	Result	Duplicate	Average	RPD %	Spk Rec %	Det Limit	Count	Err%
S01M000252	F		Pu-239/240 by TRU-SPEC Resin	uCi/g	110	<14.7	404	n/a	n/a	n/a	n/a	33	1.9	
S01M000252	F		Pu-238 by TRU-SPEC Resin IonEx	uCi/g	n/a	<14.7	125	n/a	n/a	n/a	n/a	33	87	
S01M000252	F		Np237 by TTA Extraction	uCi/g	90.5	<0.0187	0.135	n/a	n/a	n/a	n/a	0.028	17	
S01M000252	F		Uranium-234 by ICP/MS (Fusion)	ug/g	n/a	<0.120	<80.7	n/a	n/a	n/a	n/a	81	n/a	
S01M000252	F		Uranium-235 by ICP/MS (Fusion)	ug/g	91.8	<0.120	<80.7	n/a	n/a	n/a	n/a	107	81	n/a
S01M000252	F		Uranium-238 by ICP/MS (Fusion)	ug/g	105	<0.120	4.93e+03	n/a	n/a	n/a	n/a	94.0	81	n/a
S01M000252	F		Neptunium-237 by ICP/MS-fusion	ug/g	102	<0.150	219	n/a	n/a	n/a	n/a	88.1	1.0e+02	n/a
S01M000252	F		Plutonium-239 by ICP/MS-Fusion	ug/g	102	<0.150	4.31e+03	n/a	n/a	n/a	n/a	76.6	1.0e+02	n/a
S01M000252	F		Plutonium-240 by ICP/MS-fusion	ug/g	n/a	<0.150	554	n/a	n/a	n/a	n/a	1.0e+02	n/a	
S01M000252	F		Pu/Am-241 by ICP/MS - fusion	ug/g	n/a	n/a	96.8	n/a	n/a	n/a	n/a	0.010	n/a	
S01M000252	F		Cobalt-60 by GEA	uCi/g	101	<0.0138	<0.0121	n/a	n/a	n/a	n/a	0.012	n/a	
S01M000252	F		Cesium-137 by GEA	uCi/g	110	<0.0287	<0.0288	n/a	n/a	n/a	n/a	0.029	n/a	
S01M000252	F		Europium-152 by GEA	uCi/g	n/a	<0.0250	<0.0296	n/a	n/a	n/a	n/a	0.030	n/a	
S01M000252	F		Europium-154 by GEA	uCi/g	n/a	<0.0353	<0.0402	n/a	n/a	n/a	n/a	0.040	n/a	
S01M000252	F		Europium-155 by GEA	uCi/g	n/a	<0.0305	<0.0493	n/a	n/a	n/a	n/a	0.049	n/a	
S01M000252	F		Radium-226 by GEA	uCi/g	n/a	<0.215	<0.226	n/a	n/a	n/a	n/a	0.23	n/a	
S01M000252	F		Americium-241 by GEA	uCi/g	n/a	<0.0727	323	n/a	n/a	n/a	n/a	n/a	0.45	
S01M000252	F		Am-241 by TRU-SPEC Resin IonEx	uCi/g	86.8	<30.3	348	n/a	n/a	n/a	n/a	54	3.2	
S01M000252	F		Cm-243/244 by TRU-SPEC Resin	uCi/g	n/a	<30.3	<54.3	n/a	n/a	n/a	n/a	54	1.0e+02	
S01M000252	F		Alpha Env: Solids/Miscs	uCi/g	92.6	<0.311	691	n/a	n/a	n/a	n/a	0.33	1.4	
S01M000252	F		Beta in Env. Solids/Misc	uCi/g	105	<0.937	71.4	n/a	n/a	n/a	n/a	1.5	3.6	

CUSTOMER SDG #: S0032
CUSTOMER SAMPLE ID: B124H2

SAMPLE PORTION: Acid Digest

Parent: Parent

[illegible]

FH-0105384

ATTACHMENT 3

^{233}Pu CONCENTRATION FACILITY SAMPLES

**Consisting of 3 pages
Including cover page**

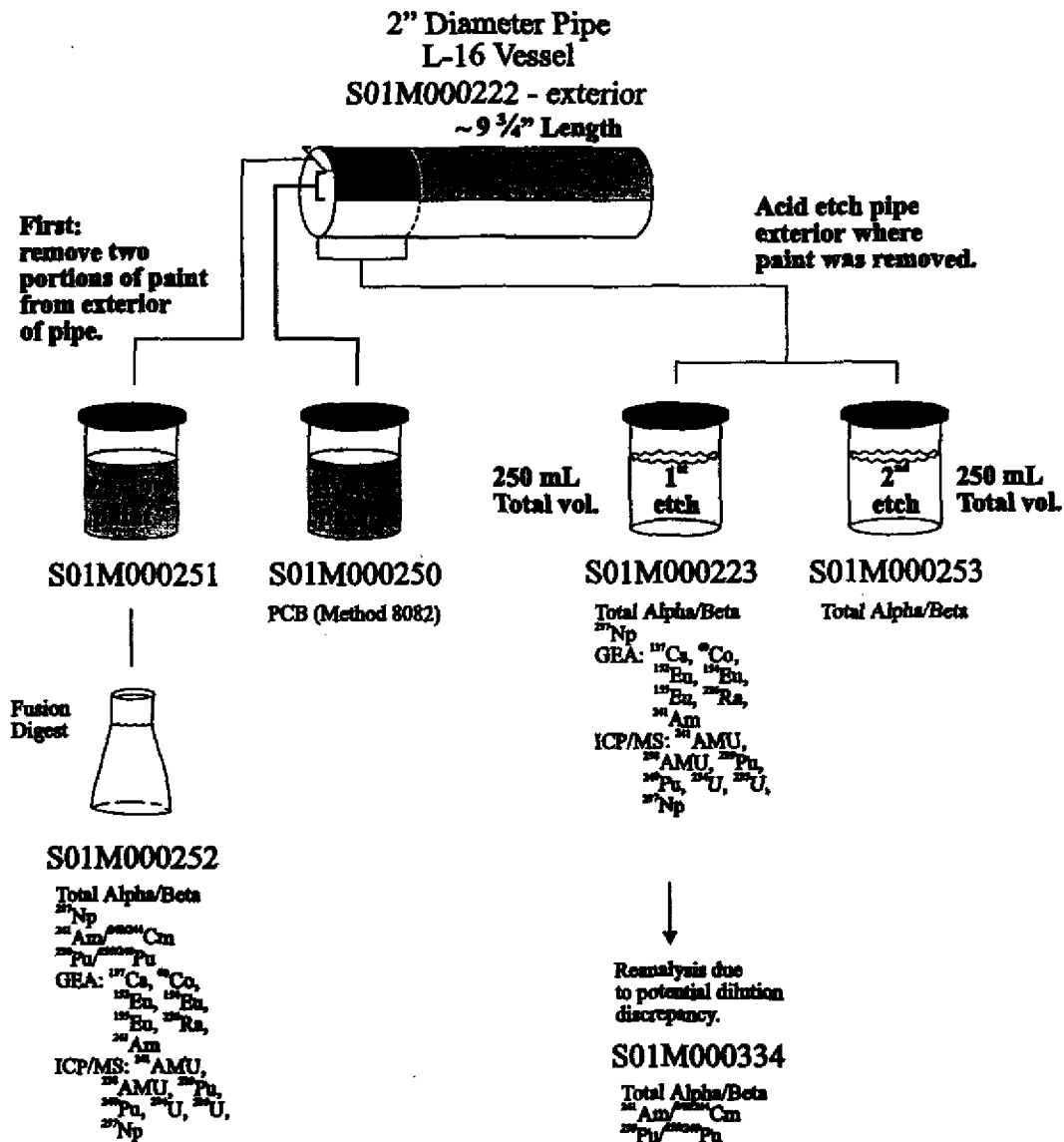
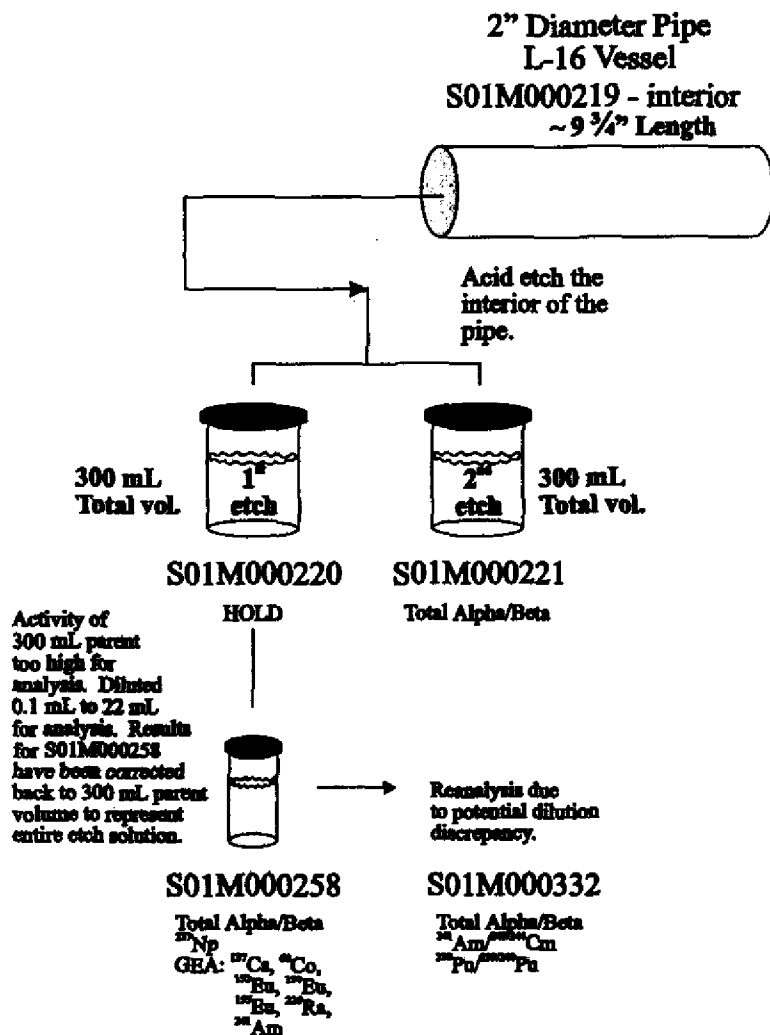
233-S Pu Concentration Facility Samples

SDG S0031

L-16 Vessel Pipe

B124H1 - interior material

B124H1-A - exterior material



233-S Pu Concentration Facility Samples

SDG S-0032
L-6 Vessel Solid
B124H2



S01M000217

Appearance

Acid
Digest



S01M000218

Total Alpha
Total Beta
GEA: Am-241, Co-60,
Cs-137, Eu-152,
Eu-154, Eu-155,
Ra-226

FH-0105384

ATTACHMENT 4

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

**Consisting of 4 pages
Including cover page**

Bechtel Hanford Inc.		CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST						B99-024-40		Page 1 of 1						
Collector <u>R. Thoren</u>		Company Contact Steve Trent		Telephone No. 372-9651		Project Coordinator TRENT, SJ		Price Code 9L		Data Turnaround 60 Days						
Project Designation 233-S Plutonium Concentration Facility Process Areas - Oth		Sampling Location 233-S		SAF No. B99-024		Air Quality <input type="checkbox"/>										
Ice Chest No. <u>4H2V-S/N 03-98/070026</u>		Field Logbook No. <u>NA</u>		COA <u>R2335P2800</u>		Method of Shipment HAND CARRY										
Shipped To 222-S Lab Operations		Offsite Property No. N/A		Bill of Lading/Air Bill No. N/A												
POSSIBLE SAMPLE HAZARDS/REMARKS 60 mR/hr on contact, 6 mR/hr at 30 cm. Interior of pipe contains 16 million dpm smearable alpha, exterior of pipe has >18 million dpm alpha direct. Approximate 2 grams of Pu. Special Handling and/or Storage				Preservation		None	None	None	None	None	None					
				Type of Container		None <u>PIPE</u>	None <u>PIPE</u>	None <u>PIPE</u>	None <u>PIPE</u>	None <u>PIPE</u>	None <u>PIPE</u>	<u>RT 5-24-01</u>				
				No. of Container(s)		0	0	0	0	0	0					
				Volume		60g	60g	60g	60g	60g	60g					
SAMPLE ANALYSIS				See item (1) in Special Instructions.	Gross Alpha; Gross Beta	See item (2) in Special Instructions.	Isotopic Plutonium	Neptunium-237	Americium-241/Curium-244							
Sample No.	Matrix *	Sample Date	Sample Time													
B124H1	OTHER SOLID	5.30.01	0900		X	X	X	X	X	<u>(Interior PIPE)</u>						
B124H1-A	Other Solid	5.30.01	0900	X	X	X	X	X	X	<u>(Exterior PIPE)</u>						
CHAIN OF POSSESSION				Sign/Print Names				SPECIAL INSTRUCTIONS				Matrix *				
Relinquished By/Removed From		Date/Time		Received By/Stored In		Date/Time		Sample is 2" by 8" long section of pipe. Extract contamination from inside of pipe and report as sample B124H1. Extract contamination from exterior of pipe and report as sample B124H1-A. Contact Joan Kessner or Steve Trent for priority order of analysis. (1) Actinides ICPMS (Americium-241, Plutonium-238, Plutonium-239/240, Uranium-234, Uranium-235), Plutonium-241, Neptunium-237 (2) Gamma Spectroscopy (Americium-241, Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155, Radium-226) <u>Prior to Analysis</u> <u>Contact Steve Trent for specific sample preparation, analysis instructions</u>				S=Soil SE=Seafloor SO=Solid SL=Sludge W = Water O=Oil A=Air DS=Dry Solids DL=Dry Liquids T=Tissue WI=Wipe L=Liquid V=Vegetation X=Other				
Relinquished By/Removed From		Date/Time		Received By/Stored In		Date/Time										
Relinquished By/Removed From		Date/Time		Received By/Stored In		Date/Time										
Relinquished By/Removed From		Date/Time		Received By/Stored In		Date/Time										
Relinquished By/Removed From		Date/Time		Received By/Stored In		Date/Time										
Relinquished By/Removed From		Date/Time		Received By/Stored In		Date/Time										
LABORATORY SECTION		Received By		Title				Date/Time								
FINAL SAMPLE DISPOSITION		Disposal Method		Disposed By				Date/Time								

Bechtel Hanford Inc.		CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST				B99-024-39		Page 1 of 1									
Collector R. Thoren		Company Contact Steve Trent		Telephone No. 372-9651		Project Coordinator TRENT, SJ		Price Code 9L									
Project Designation 233-S Plutonium Concentration Facility Process Areas - Oth		Sampling Location 233-S		SAF No. B99-024		Air Quality <input type="checkbox"/>		Data Turnaround 60 Days									
Ice Chest No. 4H2V-5/N 03-95/010026		Field Logbook No. NA		COA R233SP2800		Method of Shipment HAND CARRY											
Shipped To 222-S Lab Operations		Offsite Property No. N/A		Bill of Lading/Air Bill No. N/A													
POSSIBLE SAMPLE HAZARDS/REMARKS 16-18 Million dpm alpha on contact. 15 mR/hr on contact. Determined to be TRU, but does not contain gram quantities of Pu Special Handling and/or Storage				Preservation		None	None										
				Type of Container		Snap Vial	Snap Vial										
				No. of Container(s)		0	1										
				Volume		60mL	60mL										
						Gross Alpha; Gross Beta	See item (1) in Special Instructions.										
SAMPLE ANALYSIS																	
Sample No.		Matrix *		Sample Date		Sample Time											
B124H2		OTHER SOLID		5-30-01		0900		X	X								
CHAIN OF POSSESSION				Sign/Print Names				SPECIAL INSTRUCTIONS				Matrix * S=Soil SE=Sediment SO=Solid St=Sludge W = Water O=Oil A=Air DS=Drum Solids DL=Drum Liquids T=Tissue Wt=Wipe L=Liquid V=Vegetation X=Other					
Relinquished By/Removed From		Date/Time		Received By/Stored In		Date/Time		Perform all requested analysis from 1- 60 ml snap lid container. When analysis is complete, and final data is reviewed, The ERC may request additional isotopic and or chemical analysis (1) Gamma Spectroscopy (Americium-241, Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155, Radium-226)									
R. Thoren		5/30/01		R. Thoren		5/30/01											
Relinquished By/Removed From		Date/Time		Received By/Stored In		Date/Time											
Relinquished By/Removed From		Date/Time		Received By/Stored In		Date/Time											
Relinquished By/Removed From		Date/Time		Received By/Stored In		Date/Time											
Relinquished By/Removed From		Date/Time		Received By/Stored In		Date/Time											
Relinquished By/Removed From		Date/Time		Received By/Stored In		Date/Time											
Relinquished By/Removed From		Date/Time		Received By/Stored In		Date/Time											
LABORATORY SECTION		Received By				Title				Date/Time							
FINAL SAMPLE DISPOSITION		Disposal Method				Disposed By				Date/Time							

REQUEST FOR SAMPLE ANALYSIS (RSA)

Group ID No. (For Lab Use Only)

Sample Origin

33-5 Facility (BHI)

2. Date Sampled

5/30/01

4. Requestor's Name

SJ TRENT

6. CAGNCOA

115588/2522
R2535P2900

7. Cost Center

80400

Customer/Project Code

3. Submitted By

[Signature]

5. Requestor's Phone/MSIN/FAX

372-9651/HQ-03/372-9487

Customer ID No.

9. Laboratory Sample No.

10. Volume of Sample

11. Matrix of Sample

12. Requested Analyses

13. Expected Range

124H1/8124H1-A

8" pipe

solid

see chain of custody: ①, ③

2.0g Pu

124H2

50ml

solid

see chain of custody

< 0.01g Pu

③ call Steve Trent or Joan Kessler to discuss sample prep process for pipe leaching.

4. Does sample have a MSDS?

☐ Yes HEHF assigned MSDS No.

☒ No Description of process that produced waste/sample:

pipe scale; pipe section from process vessel system

① Interior and exterior of pipe to be analysed as two distinct and separate samples. Interior of pipe corresponds to sample # B124H1 and exterior of pipe corresponds to sample # B124H1-A.

Will radiochemistry results be used for unconditional release?

☐ Yes

☒ No

15. Is this sample RCRA listed?

☐ Yes

☒ No

Applicable Listed Waste Codes:

☐ Yes ☐ No P Codes: (list) _____

☐ Yes ☐ No U Codes: (list) _____

☐ Yes ☐ No K Codes: (list) _____

☐ Yes ☐ No F Codes: (list) _____

Applicable Characteristic Codes:

☐ Yes ☐ No D001: (how determined) _____ Ignitable

☐ Yes ☐ No D002: (how determined) _____ Corrosive

☐ Yes ☐ No D003: (how determined) _____ Reactive

☐ Yes ☐ No Toxic: (list codes) _____

PCB: Does this waste/sample contain PCBs?

☐ Yes Over 500 ppm

☐ Yes Over 50 ppm

☒ Yes PCBs are suspected

☒ No PCBs are suspected

If YES, what is the source of the PCBs?

☐ Transformer, capacitor, or ballast

☐ Other, specify _____

☒ Unknown

16. Sample Disposition

☐ Return to Customer

☐ Samples found to contain PCBs will be returned to the customer

☐ Dispose of per facility procedures with applied charges for analyses and disposal

Sample(s) Dose Rate at Contact

56L 5/30/01 40000/yr 2.5 uCi/gm

HPT Signature

17. QC Required

☐ Per 222-S Laboratory Quality Assurance Plan (HNF-SD-CP-QAPP-016) LOI for the 233-S Plutonium

☒ Other (list reference document or attach) Concentration Facility Sample Analysis

18. Special Instructions (Special Storage Requirements, Reporting format, holding times, etc.)

② Exterior of pipe (B124H1-A) is considered PCB-suspect. All other samples, including interior of pipe are not PCB-suspect.

19. Requested Turnaround Time

☐ 2 Weeks ☐ 4 Weeks

☒ Other 45 days interim

60 days final

20. Sample Received By:

[Signature]

5/30/01

0640

Date

Time

21. Chain of Custody

☐ No

☒ Yes

Number: _____

FH-0105384

ATTACHMENT 5

ADDITION OF PCB ANALYSIS TO SAMPLE B124H1-A

**Consisting of 3 pages
Including cover page**

Esch, Ruth A

From: Trent, Stephen J
Sent: Monday, June 18, 2001 7:22 AM
To: Powell, Katherine L; Esch, Ruth A
Cc: Ayres, Doris E
Subject: Addition of PCB analysis to sample B124H1-A

Importance: High

Ruth and Kathy:

Apparently the PCB analysis for sample B124H1-A was inadvertently left off the COC. Please add this analysis to the analytical request for this sample.

Thanks.

Steve Trent
ERC Sample Management
372-9651

Bushaw, Ruth A

From: Trent, Stephen J
Sent: Thursday, August 09, 2001 7:33 AM
To: Bushaw, Ruth A; Powell, Katherine L
Cc: Prilucik, John R
Subject: PCBs on 233-S pipe sample

Ruth and Kathy:

I spoke w/ Dave Encke of the 233-S project regarding the distribution of PCBs on the exterior of the pipe sample. He indicated that any PCBs found on the exterior of the pipe would be associated with the paint/fixative.

Hopefully this answers the PCB questions that Kathy asked in last Wednesday's lab status meeting.

Regards,

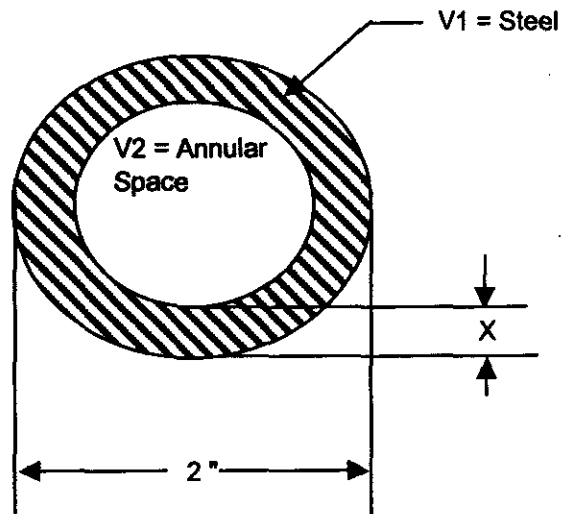
Steve

FH-0105384

ATTACHMENT 6

ACTUAL MEASUREMENTS

**Consisting of 2 pages
Including cover page**



Material	Densities (g/cm ³)
304 / 304L	7.94
309	7.98
316 / 316L	7.98
347	8.03
410	7.70

Actual Measurements:		inch	cm
	OD	2.52	6.4008
	ID	1.97	5.0038
	Wall	0.275	0.6985
	Length	9.75	24.765

Volume of Material = V1 - V2

	inch³	cm³
V1:	48.62903	796.887

V2:	29.7185	486.999
------------	---------	---------

V1 - V2 = 18.91052 309.8879

Estimated Pipe Densities		
	grams	lbs
304 / 304L	2460.51	5.424525
309	2472.906	5.451852
316 / 316L	2472.906	5.451852
347	2488.4	5.486012
410	2386.137	5.260559

FH-0105384

ATTACHMENT 7

**TEST PROCEDURE ANALYSIS OF INSIDE AND OUTSIDE WALL
OF TRANSFER PIPE**

**Consisting of 6 pages
Including cover page**

TEST PROCEDURE

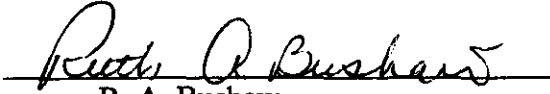
ANALYSIS OF INSIDE AND OUTSIDE WALL OF TRANSFER PIPE

Approval Designator: ES



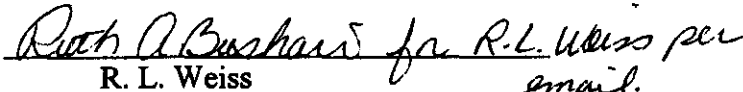
L. E. Borneman
222-S Laboratory ECO
Fluor Hanford, Inc.

6/21/01
Date



R. A. Bushaw
222-S Laboratory Project Coordinator
Fluor Hanford, Inc.

6/21/01
Date



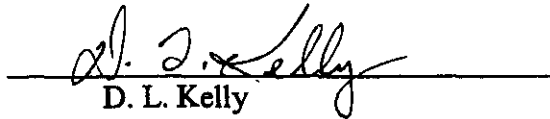
R. L. Weiss
Chemist, Sample and Data Management
CH2 Hanford, Inc.

6/25/01
Date



L. L. Lockrem
Manager, TPM
Numatec

6/21/01
Date



D. L. Kelly
Industrial Safety
Fluor Hanford, Inc.

6/21/01
Date

TEST PROCEDURE

ANALYSIS OF INSIDE AND OUTSIDE WALL OF TRANSFER PIPE

INTRODUCTION

Analytical Services has been requested by 233S Project Personnel to perform an analysis of a section of transfer pipe. The transfer pipe is from the L-16 vessel located at the 233-S facility, in the 200 West Area.

The section of pipe delivered to Analytical Services is approximately 8 inches in length and 2 inches outside diameter and appears to be composed of stainless steel. The outside of the pipe was painted with a Polymeric Barrier System (PBS), composed of modified acrylic latex. The pipe was used for radionuclide transfer during its service life.

Due to the high level of alpha contamination on the outside of the pipe, sample preparation steps will be performed inside of the glovebox in 222-S room 1C.

It is not anticipated that waste streams will be generated from this analysis, as any volume of aqueous or organic liquids will be consumed during subsequent analysis. The tests will be directed to both the internal and external portions of the pipe. Acid etching will be performed on the internal surface of the pipe for total alpha, total beta, GEA, isotopic Pu, Np, and Am analysis. The PBS will be removed and analyzed for polychlorinated biphenyls and radionuclides. The exterior of the pipe will be leached and analyzed for surface radiation contamination. Analysis will be performed in accordance with the referenced LOI and chain of custody form.

MATERIALS

1. Eluting solution (1000 mL): aqueous solution of 25% conc. HCL + 25% conc. HNO_3 .
2. Organic solvent: hexane.
3. Sharpened putty knife/paint scrapper.
4. Stoppers.
5. 250 mL graduated cylinder.
6. Four 500 mL acid resistant transfer bottles.
7. Glass container with lid for hexane soak.
8. Transfer container for hexane/PBS.
9. MSDSs for items 1 and 2.

PROCEDURE

Acid Etch for Pipe Internal Surface Area

1. Stopper one end and secure in upright position with stopper at the bottom.
2. Add 250 mL of aqueous 25% conc. HCL + 25% conc. HNO₃ solution.
3. Wait an appropriate amount of time to allow the acid to degas.
4. Stopper open end.
5. Let stand for 10 minutes.
6. Invert after 10 minutes.
7. Repeat steps 5 and 6 four times for a total exposure to the acid for 40 minutes.
8. Decant into the first 500 mL transfer bottle.
9. For second acid etch, repeat steps 3 to 7.
10. Decant into a second 500 mL transfer bottle.
11. Submit the acid etch samples for radiological analysis. All etching solutions collected after the first etching will only be analyzed for total alpha/total beta to confirm that the removable radionuclide levels were reduced.

If the radiological analysis indicates that the amount of radionuclides in the second etching is $\leq 10\%$ of the total amount of radionuclides removed, then no further etching will be required. That is, if

$$[C_s / (C_i + C_s)] \times 100 \leq 10\%$$

Where C_i = concentration in μCi from the first acid wash;

C_s = concentration in μCi from the second acid wash

If the radiological analysis indicates that the second wash still contains more than 10% of the total amount radionuclides removed, further etching will be performed. Repeat steps 2 through 10 for a third and fourth acid etch.

Polymeric Barrier System (PBS)

Estimate the surface area covered by the PBS before the procedure commences.

1. Score a section of the PBS and peel the coating off of the pipe.
2. Weigh and submit the peeled coating for PCB and radiological analysis.

Acid Etch of Pipe External Surface Area

1. Measure the area exposed by scraping of the PBS from the pipe.
2. Using the etching solution described previously, acid etch the exterior surface in two increments, exposing the surface to the acid for 40 minutes each time.
3. Collect and measure each incremental acid etch.
4. Submit the acid samples for radiological analysis.

If the radiological analysis indicates that the amount of radionuclides in the second etching is $\leq 10\%$ of the total amount of radionuclides removed, then no further etching will be required. That is, if

$$[C_s / (C_i + C_s)] \times 100 \leq 10\%$$

Where C_i = concentration in μCi from the first acid wash;

C_s = concentration in μCi from the second acid wash

If the radiological analysis indicates that the second wash still contains more than 10% of the total amount radionuclides removed, further etching will be performed. Repeat steps 2 through 4 for a third and fourth acid etch.

Alternative Approach to Removing the PBS Layer

1. Decant the appropriate volume of hexane into a glass container.
2. Submerge the pipe fully in the hexane and place the lid on the container.
3. Soak the pipe overnight in the hexane.
4. Inspect the surface of the pipe.
5. If the PBS has been removed, then submit the hexane for polychlorinated biphenyl analysis (PCB).
6. After the PBS coating has been removed, then the outside surface of the pipe will be acid etched (above) and analyzed for total alpha, total beta, GEA, Pu, Np and Am.
7. If this approach does not remove the PBS coating, further instructions will need to be provided in a revision to this test procedure.
8. If this, or another solvent removal, approach is required for removal of the PBS coating, further instructions for providing a sample of the solvent for radionuclide analysis might need to be provided in a revision to this test procedure.

DATA REPORTING

Data will be reported as $\mu\text{Ci}/\text{sample}$ or $\text{micrograms}/\text{sample}$ for the radionuclide analyses of the acid etch solutions. The entire internal surface of the pipe will be etched for analysis. The percentage of external pipe area etched will be provided. The volume of the individual etching solutions submitted for analysis will also be provided.

The results for the PCB and radionuclide analyses of the PBS layer will be reported as $\mu\text{Ci}/\text{g}$ of PBS or $\mu\text{g}/\text{g}$ of PBS. The percentage of the area of PBS removed will be provided.

Although the pipe was submitted with a weight, as a confirmatory step, a careful measurement of the pipe will be carried out. The volume of the entire pipe will be calculated and multiplied by the density of the pipe material to obtain a calculated weight of the pipe. The dimensions and calculated weight of the pipe will be reported.

SAFETY

MSDS documentation is available for all reagents in the execution of this test procedure. None of the reagents used or procedures to be performed pose threats beyond those generally encountered in the routine chemical analysis of materials in the 222-S Laboratories.

WASTES

It is not anticipated that wastes will be generated during this procedure. Liquid materials will be loaded out and sent for analysis. The pipe will be returned to the originating organization.

REFERENCE:

Letter, A.S. Chaloupka, BHI to E.F. Mares, FDH, "Letter of Instruction for the 233S Plutonium Concentration Facility Sample Analysis", 084911, dated December 20, 2000.

DATA PACKAGE TRAVELER SHEET

SDG #: W03603

SAF #: C01-046

SDR #(s): None

SAF TITLE: 100 KR4 IAM GW
Monitoring, September 2001

START/END DATE	DP PROCESS ACTION	COMMENTS
9/26/01 / 10/23/01	SDG Closure	
NA	Priority Data Rcvd	
NA	Prelim Data Rcvd	
9/26/01 / 10/23/01	Final Data Pkg Rcvd	Cnem - 10/23/01
10/23/01 / 10/24/01	Data Pkg Log-in	Cnem - 10/24/01
	On Hold (incomplete)	
	On Hold (problems)	
	Administrative Verification	
	Technical Verification	
	Validation	
	Validation Review	
	Transmittal: Box Number	

SAF-C01-046

45 DAY PACKAGE

FAX RESULTS TO:

Bob Raidl 372-9292 N/A
INITIAL/DATE

VERIFICATION OF CLIENT RECEIPT:

Phone or CC:Mail to Bob Raidl N/A
INITIAL/DATE

MAIL COMPLETE COPY OF DATA PACKAGE TO:

Bob Raidl H9-03 NPC/10/24/01
INITIAL/DATE

COMMENTS: (PLEASE INCLUDE THE FOLLOWING ON THE FAX COVER SHEET)

SDG W03603 SAF-C01-046

☐ Rad only ☒ Chem only ☐ Rad & Chem

☒ Complete ☐ Partial

ORIGINAL
Reyes

SDR # B02-011
Revision #: 0
Date Initiated: 10/8/01

SAMPLE DISPOSITION RECORD

SAF: B99-024

OU: N/A

Project ID: 233-S Facility

Task ID: 2

Sampling Event: 233-S Plutonium Concentration Facility Process

Laboratory: 222-S Lab Operations

Task Manager: A. B. Chaloupka

Sampling Information:

Number of Samples: 4

ID Numbers: B11Y22, B124H1, B124H2, B124H1-A

Matrix: Other Solid

Collection Date: 5/2/01 – 5/30/01

Issue Background:

Class: ☐ Project Data Use ☒ General Laboratory ☐ Validation Direction ☐ Sample Management
Direction Direction

Type: Sample Reanalysis

Description: Samples Reanalyzed Due to Dilution Error

Disposition:

Description: The laboratory reported that they discovered a quality problem with a dilution method used in radiochemistry analyses (see SDR B02-010). ERC Sample Management has requested that the following impacted sample analyses be rerun:

B11Y22 – Isotopic Pu and Am-241 by AEA

B124H1 – Isotopic Pu, Am-241 by AEA, and Gross Alpha/Beta

B124H1-A - Isotopic Pu, Am-241 by AEA, and Gross Alpha/Beta

B124H2 – Gross Alpha/Beta

Justification: Because the actual impact of the dilution error cannot be quantified, sample reanalysis is to be performed.

Approval Signatures:

S. J. Trent

Project Coordinator (Print/Sign Name)

Date

10/17/01

A. B. Chaloupka

Task Manager (Print/Sign Name)

Date

10/2/01

ORIGINAL *Dayes*

SDR # B02-010
Revision #: 0
Date Initiated: 10/8/01

SAMPLE DISPOSITION RECORD

SAF: B99-024

OU: N/A

Project ID: 233-S Facility

Task ID: 2

Sampling Event: 233-S Plutonium Concentration Facility Process

Laboratory: 222-S Lab Operations

Task Manager: A. B. Chaloupka

Sampling Information:

Number of Samples: 4

ID Numbers: B11Y22, B124H1, B124H2, B124H1-A

Matrix: Other Solid

Collection Date: 5/2/01 – 5/30/01

Issue Background:

Class: ☒ Project Data Use ☐ General Laboratory ☐ Validation Direction ☐ Sample Management
Direction Direction

Type: Other

Description: Incorrect Dilution Used in Radiochemistry Analyses

Disposition:

Description: The laboratory reported that they discovered a quality problem with a dilution method used in radiochemistry analyses conducted from May 2001 through August 2001. The dilution error can result in laboratory results that are bias high by 0% to 20% for some samples. This problem impacts samples that were diluted 1:10 prior to analysis. Other dilutions ratios were not affected. The following analyses may have been impacted by the dilution error:

B11Y22 – Isotopic Pu and Am-241 by AEA

B124H1 – Isotopic Pu, Am-241 by AEA, and Gross Alpha/Beta

B124H1-A - Isotopic Pu, Am-241 by AEA, and Gross Alpha/Beta

B124H2 – Gross Alpha/Beta

ERC Sample Management has requested that these analyses be rerun (see SDR B02-011).

Justification: Documentation of the dilution problem is needed to support the request for the analysis reruns on the listed samples. The 233-S D&D project will evaluate the impact of any changes to the data following receipt of the rerun results.

Approval Signatures:

S. J. Trent

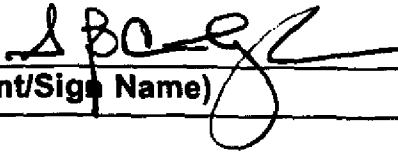


10/17/01

Project Coordinator (Print/Sign Name)

Date

A. B. Chaloupka



10/22/01

Task Manager (Print/Sign Name)

Date